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ABSTRACT

The use of learning strategies is universally encouraged, but there is a lack of specific and concrete examples. The CPC (Capacity, Pyramid, Chunking) Way of improving achievement is based on a specific learning/teaching strategy that can be used in all academic skills. It adjusts information acquisition to individual differences in learning capacity, style, and experience. The adjustment requires learners to process information in quantities that match their capacities, to organize the information in a hierarchical structure of key words (nouns and adjective-nouns), and to chunk them into a single meaningful whole for later uses. The CPC Way led to an average 6.15 point improvement in Stanford Achievement Test scores for 145 sixth graders. However, pre-CPC Way and post-CPC Way data were not collected for specific applications. To remedy this oversight, data were collected on spelling, definitions, and reading efficiency. The findings show improvement by high- and middle-capacity students on all three skills; however, low-capacity students benefited only in definitions. Reasons for this failure are advanced, and remedies suggested. The findings are highly significant because they suggest that a single learning strategy can lead to improvements in these skills. Three appendixes contain spelling and definition examples and a reading assignment. (Contains 3 tables, 2 figures, and 31 references.) (Author/SLD)

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Running head: COGNITIVE PROCESSING STRATEGY

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Effects of a Cognitive Processing Strategy on Spelling, Definitions, and Reading

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Abstract

The use of learning strategy is universally encouraged; however, there is a lack of specific and concrete examples. In contrast, the CPC Way of improving achievement is based on a specific teaching/learning strategy that can be used in all academic skills. It adjusts information acquisition to individual differences in learning capacity, style, and experience. The adjustment requires learners to process information in quantities that match their capacities, to organize the information in a hierarchical structure of key words (nouns and adjective-nouns), and to chunk them into a single, meaningful whole for later uses. The CPC Way led to a 6.15 point improvement in eighth grade Stanford Achievement Test (Stanford) scores. However, pre-CPC Way and post-CPC Way data were not collected on specific applications. To rectify this oversight, spelling, definitions, and reading efficiency data were collected. The findings showed improvements by high- and middle-capacity students in all three skills; however, low-capacity students benefited only in definitions. Reasons for this failure are advanced and remedies suggested. The findings are highly significant, for they suggest that a single learning strategy can led to improvements in these skills.

Effects of a Cognitive Processing Strategy in Spelling, Definitions, and Reading

Spelling, definitions, and reading are all necessary skills for obtaining and processing information. However, many students lack these essential skills. In spelling, for example, at the end of a year of instructions based on spelling textbooks, students varied greatly in mastery of grade-level spelling—two-thirds of the students could spell 86% of a list of curriculum words correctly, but the lowest third could spell only 46% correctly (Morris, Blanton, Blanton, Perney, 1995). In teaching from the spelling text, the teachers' activities included: (a) spelling pattern or principles instructions, (b) text-based instructions that provided task directions or explanations or required students to answer questions, (c) monitoring spelling seatwork of students, (d) checking accuracy of oral or written spelling, (e) dictating spelling words, (f) discussing word meanings, (g) giving supplemental worksheet instructions, and (h) assigning other non-text related activities.

Two theoretical approaches exist: (1) Spelling is learned one word at a time and spelling lists should be determined by word frequency alone so that shorter words would be taught first, and the use of orthographic patterns is counterproductive (Hillerich, 1976, 1987; Horn, 1957); (2) as spelling words are memorized, learners build a mental model of the English spelling system (Henderson, 1990; Hodges, 1983; Templeton, 1991). The present study did not wholly subscribe to the notion that words should be completely sequenced according to word frequency or that words should be grouped by patterns on weekly lists to facilitate formation of a mental model of English spelling words. Instead of learning a set of patterns, students should be encouraged to divide words that normally appear in textbooks by common letter groupings to prevent information overload and to chunk the groupings into a single word (e.g., mother: mo th er, moth er, mother). Finally, the formation of word lists by patterns can create a "difficult" list to learn—the student not only has to learn the spelling of a word but phonetically and semantically distinguish it from others by a letter or two. The method recommended here was based on "working memory" or cognitive processing capacity that places a limitation on quantity and chunking (Miller, 1956). Essentially, it followed the findings of a study (Furukawa & Sunshine, 1977) in which first grade

children were asked to learn to spell words in three formats (whole word, discrete letters, and chunking) by looking and listening to three audiovisual cards: (a) whole word (e.g., drip, drip, drip, with the words spelled and pronounced), (b) discrete letters (e.g., d r i p, d r i p, drip, with the word pronounced normally before it was shown and spelled with pauses between letters), and (c) chunking (e.g., dr i p, dr ip, drip, with the word pronounced and spelled with pauses between letter groupings). The children in the chunking treatment surpassed the children in the other two treatments, and the children in the discrete letter condition fared the worst. The present study extended their findings to spelling by intermediate school students but without teaching specific patterns; instead, common letter groupings were stressed.

Few specific cognitive strategies are available for learning definitions as well. The revision of dictionary definitions into ones that were "maximally comprehensible for young learners" helped (McKeown, 1993). The revised definitions identified common or characteristic uses of words to make meaning readily available, then focusing on the whole definition instead of just fragments. His research, however, attached the definition of true words to nonwords (e.g., conspicuous to *calliguous*). Instead, the present study used real words to capitalize on learning experience. For example, to learn "psychosomatic" the learner could access *mind* or *mental* for psycho and *body* for somatic). Additionally, while a "fragment" of the definition was paired with the word defined, the emphasis was on chunking of all words of a definition to form a single, meaningful whole (e.g., **psychosomatic—physical, emotional**: designating or of a physical disorder of the body originating in or aggravated by the psychic or emotional process of the individual).

The mastery of definitions (meaning) or vocabulary (words) depends upon, among other things, individual differences, type of materials, and learning strategies. Three individual differences affect learning: (a) ability level, (b) affective characteristics (motivation, emotion, perceived ability, etc.), and (c) prior knowledge about a given subject, general world knowledge, and predispositions (i.e., beliefs, attitudes and values) (Voss, Wiley, and Carretero, 1995). Generally, high-ability students retain more than low-ability students (Royer, Hambleton, &

Cadorette, 1978). In the present study, ability level or cognitive processing capacity (capacity) was operationally defined as the ability of students to recall adjective-noun pairs after a one-minute exposure (Furukawa, 1970, 1977). High-capacity students learn the spelling and meaning of vocabulary faster than low-capacity students and the latter are more adversely affected when the information quantity (words) exceeds their capacity. Despite the findings, there appears to be no differential forgetting rates for lower and higher ability students (e.g., Semb & Ellis, 1994).

In learning style (visual and/or verbal processing strength), females may be characterized as more verbal and males as more visuospatial in information processing strengths (e.g., Hedges & Nowell, 1995; Kimura, 1992). However, these characteristics are not restricted to either gender—homosexual men, for instance, perform less well on targeting tasks but better than heterosexual males on ideational fluency—normally a female strength (Kimura, 1992).

As for learning experience, the extent of knowledge available to a learner should influence learning. For instance, someone who has a poor vocabulary should encounter serious difficulty in learning a novel word because the definition of that word may also contain words that are strange to the learner.

When considering type of materials, meaningfulness is a factor, with more meaningful material (prose with substance) more likely to be retained than less meaningful material (nonsense) (Guilford, 1952). Meaningfulness can also be enhanced by organization, such as advance organizers—brief introduction about the way the information is to be presented (Ausubel, 1968, 1978), and by hierarchical structure—sequence that orders material from simple to complex (Gagné, 1985).

Learning strategies are universally recommended, but, in reality, most instructional strategies do not work (Semb & Ellis, 1994). A summary of strategies recommended for children of special needs are outlined by Scruggs & Mastropieri (1992). While all of these suggestions appear meritorious, many of them lack sufficient specificity for meaningful adoption.

Brown & Palinscar (1982) suggest a series of instructional strategies, including

cooperative learning, scaffolding (a teacher not only models the expected behavior but also provides guidance that is gradually eliminated), Socratic dialogues, and reciprocal teaching (teacher and groups of students take turns in questioning, clarifying, summarizing, and predicting). Effective learners are equated with strategy-using learners who use: (a) highlighting (underlining, mnemonics, summaries, questions, look-back strategy (reviewing), skimming, and story grammars (story characters and plots) (Gage and Berliner, 1992). Aside from strategies for children with special needs, individual differences seem to play little or no role in learning strategies. In fact, there is virtually no evidence of strategy teaching by teachers (Appleby, 1981; Durkin, 1979; Moely, Hart, Santulli, Leal, Johnson-Barron, Rao, & Burney, 1986).

In contrast to the strategies already mentioned, a more specific and comprehensive teaching and learning strategy has been developed and field tested, the CPC Way (e.g., Furukawa, Cohen, & Sumpter, 1982). It accommodates individual differences in learning capacity, style, and experiences by requiring learners to process information in quantities that: (a) match their capacity (C), (b) from a hierarchically structured pyramid (P) of knowledge or outline of key words (nouns and adjective-noun pairs), and chunked (C) by associating (verbally and/or visually) lower level key words with their headings until a single, meaningful whole is formed for later use in appropriate situations.

According to Smith (1992), there are several theories of reading: (a) A phonics advocate would teach sounds and combinations of word sounds for beginning readers; (b) a whole-word advocate would ask children to learn by recognizing whole words; and (c) the whole-language advocate would require the use of reading, writing, and speaking in learning. The phonics method, the whole-word alternative, and the whole-language alternatives are all criticized as lacking validity. For instance, the whole-language approach, in its original philosophy had nothing to do with methods, materials, or techniques; teachers were told that their attitude should be to respect language and respect learners.

During reading, as previously indicated, effective learners can use, among other strategies,

highlighting. In learning from text, underlining *per se* is not the critical factor; instead, it is the ability to decide what information is important enough to merit underlining to retain and later recall the information (Gall, Gall, Jacobsen, & Bullock, 1990). Most students base their underlining selections on what they think the teacher would consider important (Shelling, & Van Hout-Wolters (1995).

The present study asked students to underline key words (nouns or adjective-noun pairs) that are subjects of sections, paragraphs, and key words of definitions. These underlined words are then outlined under headings and subheadings to form the basis for chunking. Therefore, it was hypothesized that, being able to identify and highlight specific key words would lead to increased reading efficiency—number of words underlined equaling the number of words that should be underlined. The rationale, of course, is to encourage reading for meaning and, ultimately, increase long-term recall.

In summary, the common learning strategy for spelling, definitions, and reading was the CPC Way.

Method

Participants

All 145 entering sixth graders participated; however, not everyone took all tests. The students were almost equally divided into girls and boys. On the capacity test, girls scored slightly higher (M = 6.66) than boys (M = 6.30) and had smaller standard deviations (SD = 1.90) than boys (SD = 2.33).

Materials

A booklet for teaching the CPC Way and three types of tests were parts of this investigation. Students first learned the CPC Way of improving achievement from the booklet. It consisted of one part that outlined and explained the three principles of the CPC Way and a second part that provided instructions and examples of its applications to spelling, definitions, and reading.

Tests for capacity, spelling, definition, and reading are shown in Appendix A. Prior to being taught the CPC Way (pre-CPC Way test) and again after learning it and specific applications in spelling, definitions, and reading, students took a second test (post-CPC Way test). The spelling (Appendix B) and definitions (Appendix C) tests appeared in two lists and in two forms: One, as they would normally appear (Non-CPC Way) and Two, as adapted to the CPC Way of learning (CPC Way). The two reading assignments required students to read and underline key words for a chunking study outline (a sample assignment is shown in Appendix C) .

Procedure

All students took a capacity test in booklet form, with each student having his or her own copy. They had one minute to study a list of 20 word-pairs and two minutes to recall in writing as many words as they could remember. Each correctly recalled word counted one-half point, and the average recalled on both lists became a student's capacity score. Based on their scores, a score of $\geq$6.75 placed a student in the high-capacity category, a score of 6.50 to 4.75 in the middle-capacity category, and $\leq$4.50 in the low-capacity category.

Pre-CPC Way tests were administered in spelling, definition, and reading and were followed by the teaching of the CPC Way and its applications in these skills. After learning a skill taught the CPC Way, a posttest on that skill was administered. On both pretest or posttest, one half of the students took List One and the other half of the students took List Two as a pre-CPC Way test. After learning, for instance, spelling the CPC Way, the students received the other of the two lists as a post-CPC Way test.

For spelling and definitions, students had three minutes to learn 10 words. In scoring the spelling test, a one-letter deviation (e.g., the order of a letter reversed or a letter missing or added) was acceptable. For definitions, students had three minutes to learn the definitions of the same 10 words of the spelling test. A word was either right or wrong based on the recall of the critical word(s) of the definition and as much of the complete definition as possible to demonstrate mastery.

For reading, half of the class read and underlined important information on passages on Vietnam and the other half read and underlined passages on the Soviet Union. To measure reading efficiency, a pre-selected set of words served as the baseline; the total number of words underlined was then divided by the baseline figure. Therefore, if 10 words were underlined and 10 words were required, then a reading efficiency index (REI) of 1 would result. As a result, unlike the scores in spelling and definitions, the higher the index the poorer the quality of reading.

Pre- and post-CPC Way tests were analyzed by capacity and gender differences.

Results

The major findings on the effects of the CPC Way showed: (a) differences in spelling by capacity categories; (b) main effects and an interaction existed for definitions, with a significant gender difference; (c) and reading efficiency improved and a significant interaction favored girls on the post-CPC Way test.

Spelling

On a 3 X 2 analysis of variance (high, middle, and low capacity X pretest and posttest), with one repeated measure (tests: pretest and posttest), there was a significant main effect for capacity, F (3, 102) = 5.88, $p<.000$, but no main effect for tests or interaction (Table 2). While both high- and middle-capacity students improved from pretest to posttest, low-capacity students did worse on the posttest (Figure 1).

The gender difference was not significant, with students in both groups increasing their scores slightly from pretest to posttest (Table 3 and Figure 2). For boys, nevertheless, a significant correlation existed between capacity and spelling posttest scores (r = .43), $p<.003$.

Definitions

A 3 X 2 analysis of variance found two significant main effects for capacity, F (3, 121) = 11.84, $p<.000$, and for tests, F (1, 121) = 27.96, $p<.000$, and a significant interaction, F (3, 121) = 4.67, $p<.000$ (Table 2 and Figure 1), with high- and middle-capacity students increasing more than low-capacity students.

than low-capacity students.

Because girls increased 3.65 points (296%), from a mean of 1.86 to 5.51, and boys increased 3.55 points (380%) from a mean of 1.27 to 4.82, (Table 3 and Figure 2) there was a significant gender difference: $\underline{F}$ (1, 116) = 194.40, $p<.000$. For girls, a substantial correlation existed between capacity and definition posttest scores ($\underline{r}$ = .42), $p<.003$. For boys, on the other hand, both test scores correlated substantially with capacity scores: for pretest scores, it was .43, $p<.003$; for posttest scores, it was .58, $p<.000$.

Reading

Disregarding capacity and gender and limiting the analysis only to total number of words underlined, for the pretest an average of 156 words were underlined. This average was reduced significantly to 119 on the posttest, X^2 (1) = 4.71, $p<.05$.

As for REI, high-capacity students increased by .53, middle-capacity students increased by .19, but the low-capacity students declined by 3.29 points (Table 2 and Figure 1) but these mean REI did not differ significantly.

A strong gender difference appeared: Girls improved by lowering their REI from 6.24 to 3.36, but boys declined by increasing their REI from 6.51 to 9.51; thus, a significant interaction emerged between tests and gender, $\underline{F}$ (1, 123) = 25.40, $p<.000$ (Table 3 and Figure 2). The REI on the pretest correlated .45, $p<.002$, for boys.

Discussion

The findings generally supported the hypotheses that the CPC Way improves performance in spelling, definitions, and reading efficiency; where it did not, indications of the source of the difficulty were identified and remedial action suggested. As in the results section, the discussion appears under the rubrics of spelling, definition, and reading.

Spelling

While high- and middle-capacity students improved, the number correct declined slightly for low-capacity students (Figure 1). Three reasons may be advanced for the decline:

(a) insufficient time in relation to capacity, (b) information overload, and (c) low meaningfulness. Additional learning time is necessary for lower ability students (Scruggs & Mastropieri, 1992), and a capacity-matching quantity is ideal for all learners (Furukawa, 1970); all students had three minutes to learn the 10 words and the quantity of words clearly exceeded the average capacity of the low-capacity students by two-fold (capacity of ≤4.50). The quantity of 10 is actually a count of the number of words; however, if the learner encounters difficulty in chunking the separate letters into a whole, then the quantity is larger. Psychosomatic, for instance, could consist of 13 bits (letters) or 3 chunks (psycho so matic). It is possible that the paucity of appropriate learning experiences with the letter groupings (psycho and matic or somatic) made the word more difficult for low-capacity students than for high-capacity students even if the word was a novel one for both groups.

The remedies suggested are: (a) increase learning time, (b) provide more practice time on selecting and chunking letter groupings, and (c) teach fewer words before reviewing. These remedies apply specifically to lower capacity persons, but they could also apply to learning disabled students and to the less verbally oriented boys—the substantial correlation between spelling and capacity scores indicates that they had experienced greater processing difficulty. An introductory activity should also, if necessary, teach the definitions of the words and place them in a meaningful context before spelling is taught. Finally, spelling can probably be improved by isolating the source of spelling errors when dividing words into letter groupings (e.g., Feb r uary, and gover n ment).

Definition

The CPC Way had an extremely strong effect in learning definitions, with high- and middle-capacity students gaining the most (3.90 points and 4.04 points, respectively) and low-capacity students improving by 1.78 points (Table 2 and Figure 1). Despite their relatively low mean, the percentage gains of the lower capacity students equal those of the higher capacity students. The major reason for the improvement is probably the reduction of information load by

chunking the word to be defined with the key word(s) of its definition. Grouping definitions under a heading could have also contributed to the reduction of information load by facilitating chunking across definitions.

The advantage of girls in verbal knowledge (e.g., Hedges & Nowell, 1995) allowed them to score higher than boys. It is noteworthy, however, that the boys improved more than the girls (380% versus 296%). Nevertheless, it can be assumed that there was a greater drain on capacity for the boys as their capacity scores correlated .58 with definition recall scores; the correlation for girls was negligible.

Reading

Highlight important words is a universal suggestion (e.g., Gall et. al., 1990). Little guidance exists, however, as to what are "important words" or how notes are to be taken and studied. As a result, the tendency is to underline entire sentences; at least, more words than necessary are underlined as shown by the significant difference in the total words underlined—fewer words were underlined after being taught to underline key words (nouns and adjective-nouns that are the essence of definitions or are subjects of sentences, paragraphs, and sections).

Again, low-capacity students suffered from a lack of learning experiences in vocabulary and reading per se. Consequently, having learned that they were not underlining enough when learning applications of the CPC Way, they seemed to have taken the message literally and underlined more words; unfortunately, many of these words were not required to gain a complete understanding of the key elements of the text. Clearly, they need greater vocabulary training and reading experiences in lower grades and an earlier exposure to the CPC Way of improving achievement would have helped them.

In conjunction with the general lack of progress of the low-capacity students, a positive chord should be struck. It can be inferred from the findings that capacity is an influential variable in learning. Therefore, any learning strategy should give it a prominent role as has been done by the CPC Way. Also, in mitigation of the adverse effects on the low-capacity students, the spelling,

definition, and reading assignments were deliberately designed to provide more information than the average capacity student could process at one time. This influence was also exacerbated by the short time provided for study.

Conclusions

Spelling, definitions, and reading have been positively influenced by the CPC Way. While not everyone benefited equally, the reason for this unequal benefit is clear—the experiment was not designed to benefit specific individuals (e.g., someone with a low capacity). By customizing learning tasks to individual differences, greater benefits appear possible. For example, someone with a lower capacity would be provided capacity-matching quantities of units of information, from a hierarchically structured outline, and provided adequate time to chunk them in forming a single, meaningful whole for use in appropriate situations. Thus, the CPC Way is capable of making it possible for most persons to benefit equally from a learning task by adjusting learning to individual differences in learning capacity, style, and experience. In doing so, specific guidance is provided in identifying, organizing, and processing key words for long-term retention and recall. Such a single, general strategy has much utility and is likely to be used by students and teachers.

Future research should examine the effects of a customized program of learning by students with varying capacities, learning style, and learning experience. Furthermore, a more integrated approach is recommended: spelling and definitions of key words selected from readings in a particular subject area.

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Appendix A. Spelling Examples

Non-CPC Way Spelling List

1. hospice
2. dysfunctional
3. psychosomatic
4. charisma
5. parsimony
6. disable
7. enigma
8. disheveled
9. assiduous
10. vulnerable

CPC Way Spelling List

1. **hospice:** hosp ice, hospice
2. **dysfunctional:** dys function al, dysfunction al, dysfunctional
3. **psychosomatic**: psycho so matic, psychoso matic, psychosomatic
4. **charisma**: cha ris ma, charis ma, charisma
5. **parsimony**: par si mony, parsi mony, parsimony

(Stop and review)

6. **disable**: dis able, disable
7. **enigma**: e nig ma, enig ma, enigma
8. **disheveled:** dish eve led, disheve led
9. **assiduous**: as sid uo us, assid uo us, assiduo us, assiduous
10. **vulnerable**: vul ner able, vulner able, vulnerable

(Stop and review)

Appendix B. Definition Samples

Non-CPC Way Definitions

1. **hospice**: Home or shelter for terminally ill patients.
2. **dysfunctional**: Impaired or abnormal functioning
3. **psychosomatic**: Designating or of a physical disorder of the body originating in or aggravated by the psychic or emotional process of the individual.
4. **charisma**: Magnetic, personal appeal that influences and inspires.
5. **parsimony**: A tendency to be overcareful in spending.
6. **disable**: Deprive of physical, moral or intellectual strength.
7. **enigma**: A person or statement that is not explainable.
8. **disheveled**: Untidy in personal appearance.
9. **assiduous**: A diligent or persistent person.
10. **vulnerable**: Capable of being wounded.

CPC Way Definitions

PEOPLE

Health

1. **hospice—terminally ill**: Home or shelter for terminally ill patients.
2. **vulnerable—wounded**: Capable of being wounded.
3. **dysfunctional—impaired**: Impaired or abnormal functioning.
4. **disable—deprive**: Deprive of physical, moral or intellectual strength.
5. **psychosomatic—physical, emotional**: designating or of a physical disorder of the body originating in or aggravated by the psychic or emotional process of the individual.

(Stop and review)

Personality

1. **charisma—appeal**: Appeal, magnetic or personal, that influences and inspires.
2. **disheveled—untidy**: Untidy in personal appearance.
3. **parsimony—stingy**: A tendency to be over careful in spending.
4. **enigma—baffling**: A person or statement that is not explainable.
5. **assiduous**: A diligent or persistent person.

Appendix C. Sample Reading and Underlining Assignment

Historical Development

PEASANT REVOLTS. Revolution in Russia was not a new idea, for Russia had a long tradition of revolutionary actions. The earliest revolts were usually unorganized and spontaneous peasant revolts and were local in character except for the rare cases when a Razin or Pugachev rose to lead a national revolt. With no defined objectives and no plan for political consolidation after success, these peasant uprisings were largely ineffectual expressions of blind fury and exasperation. It is interesting to note that in all cases, peasant animosity was directed locally and not against the Tsar, the "Little Father of All the Russians." It was assumed that if he were aware of the plight of his "children" he would immediately take steps to provide for them. This kind of revolt, therefore, though often repeated throughout history, achieved nothing toward the amelioration of the peasant's lot.

PRELUDE TO DECEMBER 1825. Although Catherine the Great regarded herself as an "enlightened despot," historians generally agree that she was infinitely more "despotic" than "enlightened." She was succeeded by Paul, the mad weakling, who set up a virtual iron curtain between Russia and Europe. Paul, in his insanity, once ordered an elite lifeguard regiment to march on India from Moscow, because he had embarrassed himself before the English ambassador. Positions in the government were unstable and led to a plot to remove Paul from power and to put him under the guardianship of his son Alexander. When Paul resisted, he was killed and Alexander ascended to the throne.

READING ASSIGNMENT. Suggested words to underline

Historical Development

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Table 1

Mainstreaming strategies recommended (adapted from Scruggs & Mastropieri, 1992):

1. goals for learning
2. additional learning time
3. sufficient time to respond
4. structure in lessons
5. developmentally appropriate content
6. external memory systems (e.g., writing things down)
7. instructional intensification (e.g., highlighting important points)
8. listening skills
9. tutors
10. mnemonic devises
12. effective coding methods
13. reduced classroom demands
14. materials made equally meaningful to everyone
15. special support in language problem areas
16. achievement measurements taken later rather than earlier in learning
17. language activities in regular instruction
18. textbook only where appropriate
19. effective teaching methods
20. "discovery learning, " "inquiry," or "constructivist" approaches may be too complex.

Table 2

Spelling, Definitions, and Reading: Differences In Pretest-Posttest Scores by Capacity

	Spelling[b]		Definition		Reading[c]	
Capacity[a]	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
High	7.92	8.23	2.41	6.31	9.13	8.60
Middle	7.96	8.28	1.64	5.68	6.38	6.19
Low	6.48	6.19	.61	2.39	4.32	7.61

Note. [a] H = 13, M = 69, L = 21; [b]Pretests and posttests were administered before and after students learned the CPC Way; [c]reading scores are REI, a ratio of words underlined divided by words required, with a higher REI indicating poorer reading abilities.

Table 3

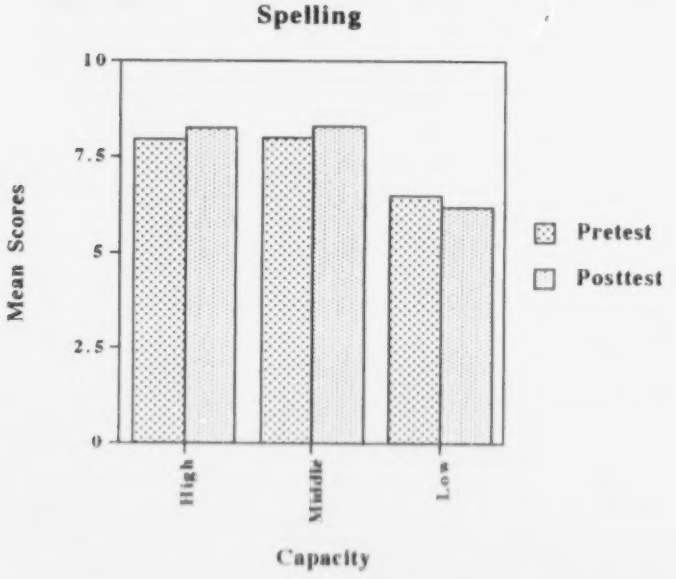
Spelling, Definitions, and Reading: Differences In Pretest-Posttest Scores by Gender

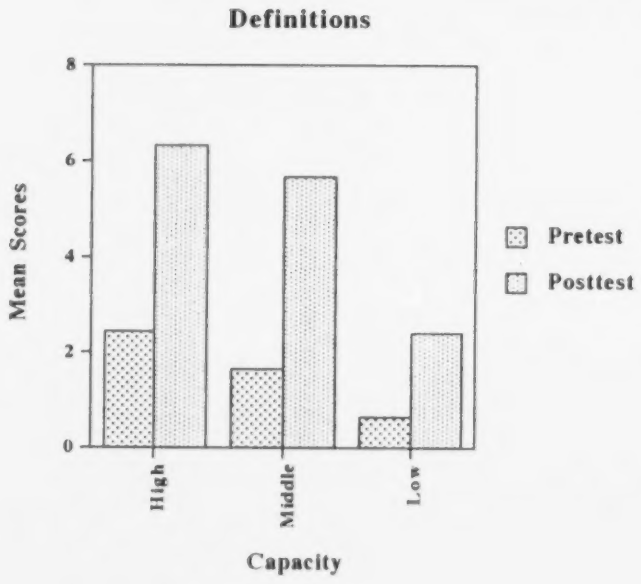
	Spelling		Definition		Reading[c]	
Gender[a]	Pretest[b]	Posttest	Pretest	Posttest	Pretest	Posttest
Girls	7.56	7.76	1.86	5.51	6.24	3.36
Boys	6.97	7.09	1.27	4.82	6.51	9.51

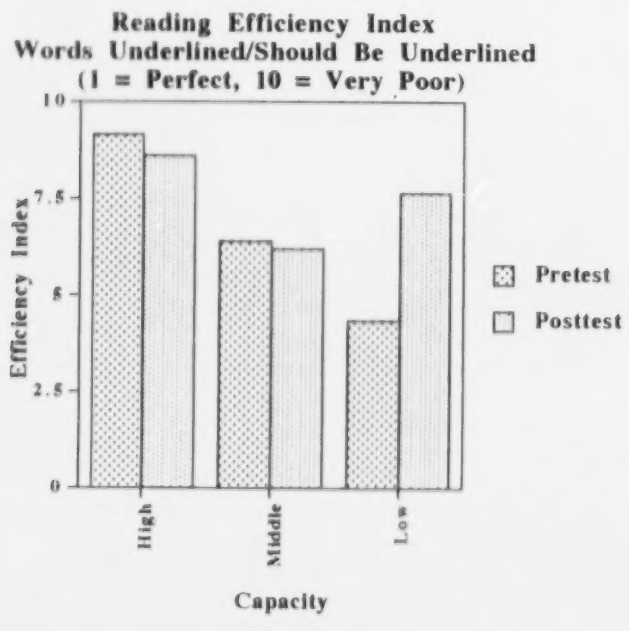
Note. [a]72 girls and 67 boys; [b]Pretests and posttests are tests administered before and after students learned the CPC Way; [c]reading scores are REI, a ratio of words underlined divided by words required, with a higher REI indicating poorer reading abilities.

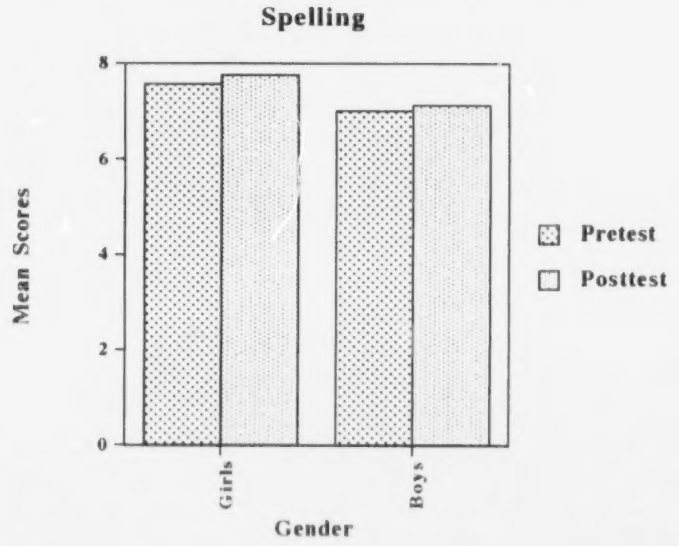
Figure 1. Spelling, definition, and reading efficiency index scores for high-, middle-, and low-capacity students.

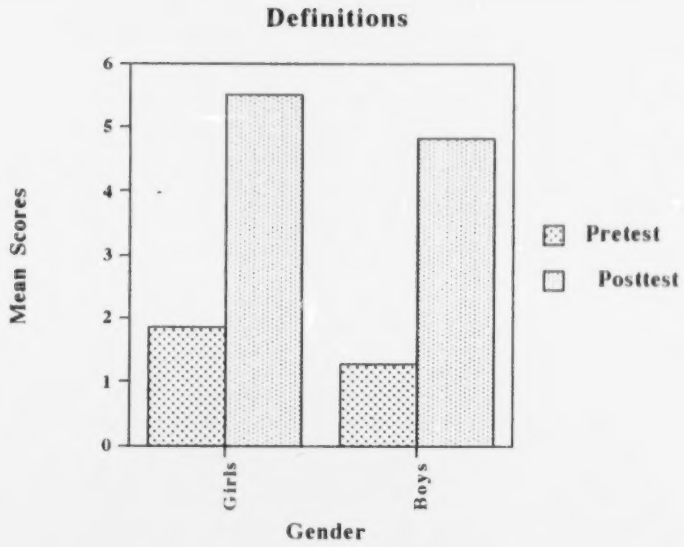
Figure 2. Spelling, definition, and reading efficiency index scores for boys and girls.

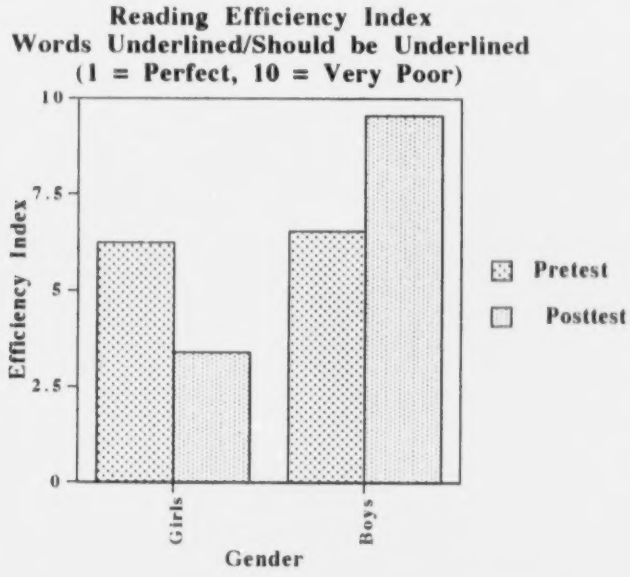

Spelling
Mean Scores
10
7.5
5
2.5
0
High
Middle
Low
Capacity
Pretest
Posttest


Definitions
Mean Scores
8
6
4
2
0
High
Middle
Low
Capacity
Pretest
Posttest


Reading Efficiency Index
Words Underlined/Should Be Underlined
(1 = Perfect, 10 = Very Poor)
Efficiency Index
10
7.5
5
2.5
0
High
Middle
Low
Capacity
Pretest
Posttest


Spelling
Mean Scores
8
6
4
2
0
Girls
Boys
Gender
Pretest
Posttest


Definitions
Mean Scores
6
5
4
3
2
1
0
Girls
Boys
Gender
Pretest
Posttest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Words Underlined/Should be Underlined
(1 = Perfect, 10 = Very Poor)
Efficiency Index
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7.5
5
2.5
0
Girls
Boys
Gender
Pretest
Posttest